Preserving the Natural Sponge between Water and Land through Regulating Wetlands

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ABSTRACT

This article examines the nature of wetlands in the developed and developing world, and the intrinsic problems associated with each area. The intention is to look at regions that are most vulnerable to potential damage and suggests possible measures to guard against it. Human progressive endeavours can be carried out with minimal damage to wetlands. It is the position of this work that the preservation of wetlands should be a collective effort between individuals, corporate organizations and the various federal governments in recognition of the magnitude of the task at hand. This should be a better position than mitigation of new wetland sites. Aside from restoration of the wetlands, concerted efforts at conservation and monitoring of results of reclamations are also paramount. As such, the work suggests the sensitization of the populace, especially industrialists, on how their activities may be seamlessly aligned with the needs of the wetlands.
Keywords: *Wetlands, sensitization, restoration and reclamation, mitigation, conservation, results monitoring.*

INTRODUCTION

Wetlands typically cover a vast expanse of land and are characterised by being wet and soggy throughout most of the year. The idea of wetlands has mostly been conceived by man as areas that exist to be manifestly explored to achieve the ultimate purposes of human endeavour. Wetlands have for so long been traversed to support human activities and have therefore "undergone severe spatial changes from rapid urbanization in the past" (Missouri Botanical Gardens 2002). The term wetlands, typically encompasses a wide variety of aquatic habitat including swamps, marshes, bogs, prairie potholes, floodplains and fen (Missouri Botanical Gardens, 2002). Prairie potholes are shallow depressions also characterized by some forms of wetness. The wetness may not be there at all times during the year. They are often used for breeding by birds. They are unique and provide habitat for a wide plethora of birds. In this regard, the state of a wetland can be determined by recourse to the population of birds at any point in time. The Missouri Botanical Garden (2002) also notes that another important form of wetland is the riparian marshes. These are marshes that occur along rivers. These marshes serve two ecological roles; to absorb excess water when river levels are high and to release water when river levels are low. These balancing help to prevent floods and droughts. As such they help to support animal life in seasons of drought. Areas that are immediately within the zones of streams also experience flooding and are known as floodplains. It includes the floodway which consists

of the stream channel, and adjacent areas. Floodplains are prominent features of many rivers. The best developed floodplains are along the Nile, where the alluvial deposits have provided very valuable soils for agriculture for thousands of years. The wetlands in South Eastern Nigeria consist of shale, coastal plain, atomic soil, sombreiro Warri Deltaic deposit, mangrove swamp deposits, and beach sands. Fadamas bear much resemblance to floodplains, but are entirely different in use. The Lagos State Fadama Co-ordination office notes that the term 'Fadama' is a Hausa name for irrigable land-usually low lying plains under laid by shallow acquifers found along major river systems. In addition to providing a source of water for livestock during dry season, Fadamas also support large and diverse resident for transient wildlife including herbivores, carnivores and sand migratory songbirds" (fadama). "Spatial distribution of wetlands showed a decrease from the coast to the interior. This could be attributed to more rivers, floodplains and swamps fed by tidal effects in the coast, relative to the interior" (Chukwu, Chude and Expo, 2009). This work therefore delves into preserving the natural sponge between water and land through regulating wetlands.

The Diverse Usefulness of Wetlands

Wetlands have always witnessed incursions by people for various purposes. In the past, there were uncertainties about the expected uses or recognised natural purposes of these areas; as such human beings continued to adapt them to achieve their own ends through urbanisation. However, wetlands are now recognised by the United States Environmental Protection Agency (EPA) as "transition zones between uplands and deeper waters unique ecosystems characterized by their hydrology, soils and vegetation (EPA, 2006). They function like natural water tubs, storing flood waters that overflow river banks and surface waters that collect in depressional areas. In this way, wetlands can help protect adjacent downstream property from flood damage" (EPA, 2006).

The issue of flooding has always been a perennial problem to the environment. Building structures also quickly deteriorate from long term accumulated water seepage in the foundation despite proper maintenance practises. The beauty of the environment is enhanced by strategic and timely drainage of flood water. Ditches performed these functions, but they have proved to be inadequate. On the other hand, wetlands have a comparative advantage, especially for unforeseen storm surges and torrential rainfall. There are numerous other evidences of wetlands significant flood control mechanism; "the bottomland hardwood-riparian wetland along the Mississippi River once stored at least 60 days of floodwater. Now they store only 12 days because most have been filled or drained" **(**EPA, 2006).

Wetlands are exceptionally adapted for food cultivation. They are well suited for the cultivation of 'Fadama' or swamp rice which was introduced into Cross River plains in Nigeria in 1946 (Udo, 1983). The Fadama rice fields have ensured that a country like Nigeria can shift the paradigm from total dependence on oil to exploring other immense opportunities in agricultural activities. The wetlands in these areas, because of its viability as well as adaptation for the cultivation of rice have attracted asset financing. The Lagos State Fadama co-ordination office also confirms that US $450 million Fadama project is

being implemented in 35 states and in Nigeria's Federal Capital Territory (Fadama). Another benefit of riverine swamps or wetlands is for cattle grazing. Because of the abundance of rainfall throughout Nigeria, grazing of livestock is "adopted in order to exploit the natural grazing resources. These resources are limited by two environmental constraints: the long dry season and the tsetse fly; the vector of trypanosomiasis" (Mortimore, 1983). Ordinarily, the savannah range lands in the north provide enough grass for the cattle even in the wet season but in the dry season dependence is on riverine swamps (Fadama) where grass roots can reach sub-surface water (Mortimore, 1983). Improvement in water quality is achieved by using waste wetlands as filters for waste water treatment, in particular the removal of excess nitrogen and phosphorus. Especially in rural areas the goal of using wetlands as waste water treatment system for non -point source pollution is a major objective (Mitsch and Gosselink, 1993).

The Impact of Urbanization on Wetlands

To properly understand the framework for the present state of wetlands today, it may be expedient to examine some territories that have witnessed dramatic changes in the look of their wetlands. The Nigerian colonial economy was based largely on the production for export of industrial crops, minerals and forest products and it was the areas producing these commodities and the two major ports of Lagos and Port Harcourt that attracted most immigrants (Mortimore, 1983). Railways were constructed to link centers of production and they inevitably led to the founding of new towns where none existed before. Ayeni (1983) states that available wetlands were decreased by the construction of these railroads. Also, aside from unemployment the rush to new towns meant an escalating residential crisis. Shanty towns began to spring up in wetland swamps in response to the unending influx of people. Most of the residents of these areas embarked on intense farming which went on all year round without any break.

Over time, the fertility of these areas began to decrease due to prolonged periods of farming. However, wealth from petroleum provided the financial resources to invest in both infrastructural and industrial development" (Ayeni, 1983). The cities took their expansion from most state capitals. This has led to a marked increase in industrialization activities. Because of the vast pool of funds available, growth in all productive sectors advanced at a rapid and often unmonitored sequence. Obiefuna, Nwilo, Atagbaza and Okolie (2013), in assessing the Lagos area of Nigeria observe that swamps and the mangrove wetlands which spread over lagoons in seven council areas in 1980 had dwindled to only four councils in 2006 and attributed the decreases to urban development pressures.

Emissions and other forms of industrial waste also account for wetland degradation. Most materials for disposal are not hazardous in themselves despite public concern and outcry over their composition. The greatest single constituent of solid waste, (defined as waste that is collected and transported by a means other than water) is construction and demolition debris, all of which is either reused or eventually buried in the ground. The second largest volume of waste is that generated by the commercial and industrial sections, followed by the domestic waste generated by residences (Baird and Cann, 2008). Because

of the bulky nature of solid waste, the main method used for disposal of Municipal Solid Waste (MSV) is to place it in a landfill (also variously called a garbage dump or rubbish lip,) which is a large hole in the ground that is usually covered with soil and, or clay after it is filled (Baird and Cann, 2008). Principally in developing countries, the percentage of solid waste increases from vegetation and progresses to paper. But after tracking commercial solid waste in far more developed countries, it is clear that paper accounts for far more waste product than any other commodity. Packaging plays a distinct role in contributing to the amount of paper waste. Plastics are also popular for packaging since they are designed to be used once and then discarded (Baird and Cann, 2008).

In developing countries, plastics are not properly disposed of; and because they do not decompose easily, they affect the soil. While land filling sounds like an excellent method of disposal of garbage, the main issue to note is that in wetlands or river coastland, top filling garbage dumps with soil or clay tampers with the porous nature of the area. We now have an area which naturally should absorb floods and other run off surface waters being clogged by waste deposits as well as clay, since clay soil is not porous in nature. The resultant effect is that a natural realm of barrier is created where overspills from rivers cannot be absorbed; neither can water from urban areas find their way to the rivers. Poor drainage retard organic matter decomposition, which also affects water quality (Watanabe, Dietta and Rogers, 1988). The same view is also held by Getches (1990). He comments that placing waste in the ground causes pollutants to seep into the groundwater. The extent of the concentration of such waste may increase harm to human health and the environment. As such, protection of groundwater necessitates control of dumps and, in many cases, clean-up of old sites**.**

The Use of Regulatory Activities to Preserve Wetlands

The use of regulatory agencies as a natural sequence in social development has been acknowledged. This is necessary to match the dynamics of economic and social expansion. While it is agreed that law and policy, though usually put to multiple use may not tactically be a relevant strategy in environmental degradation control, they can and usually do exert pressure to achieve expected ends through legislation or by contractual agreements (Okorodudu – Fubara, 1998). In order to diffuse the ever mounting pressure on the land, town planning laws are put into place. This is in a bid to prevent an outbreak of disease, odious smell, and non- conforming use of land.

According to Heap (1983) the early planning statutes in Nigeria, like their English counterparts were aimed primarily at protecting the environment against wide spread abuses. From the Lagos Improvement Act, 1863 and the Swamp Improvement Act, 1877 to the Public Health Act 1917, the thrust has had been to improve our towns with broad street, 'cleanse' the environment of filth; remove and reclaim swamp lands or clear bushes from our urban surroundings (Heap, 1973). By law, a property is considered in a flood zone if any part of the structure falls within a floodplain; an area that is adjacent to a stream or a river that experiences periodic flooding (Wiley-Blackwell, 2008). The effect of floodplains can be seen by utilizing Geographic Information Data System. It has been found that

residential property located within a flood zone has a significantly lower house sale price due to hazards associated with such locations. The Ramsar Convention is an international agreement signed in Ramsar, Iran in 1971. Mandel, Barnes, Stouffer and Capello (1971) when presented a paper at the Ramsar Convention note that on-going human modifications of these wetlands may lead to pollution from deposition of wastes. This leads to decreased water quality and bioaccumulation of toxins in wetland species. There is loss of spawning and feeding ground for fish; habitation destruction is the number one cause of the reduction of fish population. In this instance, it is necessary that there is gradual restoration of life to areas that have been affected by unregulated activities (Mandel, Barnes, Stouffer and Capello, 1971). In this way, aquatic species that are naturally susceptible to external disturbances will be rejuvenated.

The New Hampshire Department of Environmental Services (DES) is in charge of evaluating permits for the construction and maintenance of ponds (DES. Nd). When evaluating a wetland application, DES considers the necessity of the wetland impact, the effectiveness of any proposed mitigation, and the individual significance of the particular wetland resource in question. The various reasons why people may want to develop ponds include fire protection, irrigation for agriculture and livestock, aesthetic and recreational value. It is part of the duties of DES to designate an area as a wetland. When this is done, the applicant has to work within a framework that insists on minimalism of changes to the area in question. The prevalence and type of wetland vegetation is an indicator to determine significant boundaries. Wetland scientist are then required to establish wetland boundaries, to make sure the dug pool will not impact adjacent wetland areas or other municipally designated prime wetlands (DES).

Most times, the burden of proving that no harm will result from the designated use is on the person seeking the new permit for construction of a given structure. Most regulatory bodies are empowered to authorize denial on public interest grounds. Such concerns include damage from excess humidity, as well as unpleasant odours. The task of maintaining tranquillity in wetland zones cannot be compromised in granting most of their approvals. Other categories of waste may include discharge of dredge and fill materials. To avoid indiscriminate dumping of waste, "section 404 of the Clean Water Act requires dredge and fill permits from the Army Corps of Engineers for discharge of dredge and fill materials into waters of the United States" (Getches, 1990).

Preserving water quality means a restraint to possible sources of water contamination, no matter how far off they may seem to be. The regulated area is very wide. It includes thousands of acres of public and private lands often far from any river, which support plant growth typical of wetlands. Another management advantage of the scope of protection granted to wetlands from other irregular uses such as construction of bridges, dams and roads was to enhance flood control activities and shellfish operations. The primary consideration for granting of permits, especially in wetland areas seems to be "economics, cultural concerns, energy needs and welfare of the people as well as a variety of environmental factors" (Getches, 1990).

Recovery and Restoration of Wetlands

The most powerful motives behind the reclamation of most wetlands was the recovery of the areas as valuable avenues that support wildlife shell fishing as well as most forms of vegetation. The upper Mississippi River Basin has been a very thorny area for FEPA (Federal Emergency Management Agency- United States) and research work is on as to how to restore the 100 years old flood zone of the upper Mississippi five state watersheds. Summarily, 39 million acre feet of flood water caused the great flood of 1993, and it is estimated that a restoration of the area would help store the same amount of water by restoring the natural hydrology of the floodplain.

The Wetland Initiative Study (2006) projects that the cost of restoration would be $1.5million, compared to potentially millions of dollars lost to flooding. The current sequence seems inclusive, rather than cautionary. The meeting point will be controlling flooding in combination with other traditional methods. Across professions, modern and traditional means of control seem to reflect the fact that the environment is always in a state of flux. The approach to flood control at any point in time would depend on the extent, as well as the layout of the area in which it occurs. Each method used would serve as a reference for future controls. It is difficult to visualize any wetland that is totally free from human or climatic influences. Demands on the topography of wetlands occur bit by bit. All the changes have a historical base. Krier (1970) suggests that demands on wetlands such as slaughter of wildlife and harvesting of forests deteriorate wetland resources. He instead encourages less threatening interests like bird watching, biking and camping.

Conservation of wetland by the USDA Forest Service (Nd) is a hybrid of an idea which has been found to be workable. It is a shift from the traditional approach and blends the efforts of traditional landowners with that of the Federal Government. The wetland reserve program is a voluntary program which offers financial support to landowners 'wetland restoration and conservation projects (USDA Forest Service, Nd). The whole essence is that conservation easements are obtained from land owners by the Federal Government. The cost of rehabilitation is then shared. Restoration of wetland hydrology and vegetation restores the function and values of wetlands for migratory birds and other wildlife, improves water quality, aides in flood retention and groundwater recharge, increases open space, and provides aesthetic values and environmental education opportunities (USDA Forest Service Nd). The government may buy the easements outright at about 50% cost of restoration with the land owners in exchange for the land owners transferring 30 year easements to the government.

India does not have strong laws to prevent the misuse of its wetlands which consist of lakes, ponds and marshes, mangroves, backwaters and lagoons. They have been effective in flood prevention and adding value to the economic food chain. The issue with wetlands in India is that they are usually classified as "waste land" by the government and transformed to "real estate" or to dumping sites (Rainwater Harvesting, Nd). No wonder India has lost over 40% of its wetlands. India is party to the Ramsar Convention (1971). But from an all-time high of about 700 wetlands, India now has only 25 listed with the Ramsar Convention. The wetlands (Management and Conservation) Rules 2008, gave credence

to the growing clamour for environmental protection. However, it lacked regulatory backup. This gap was filled through the National Environmental Policy (NEP) which recognised the need for proper regulation of the wetlands. The threats to be regulated in the wetlands include diminishing fauna and maintenance of the storm layer drains. However, there is need to ensure private participation in the recovery programme, especially on privately owned land (Rainwater harvesting, Nd).

Wetland "restoration takes place on land that has been, or still is, a wetland" (Kentula 2002). In restoration, some issues that may arise include enhancing a particular function of an existing wetland over and above others. For example, a wetland may be enhanced as a sanctuary for a particular specie of migratory birds at the expense of other wildlife. Besides, goals for restoration are seldom stated by project managers, and after completion, monitoring to ensure adherence to known objectives is hardly continuous or documented for future reference (Kentula 2002).

Present and projected uses of wetlands influence selection, as wetlands in non-urban areas are free from disturbance in terms of human activity. The benefits of site selection may include restoration of river bank wetlands between agricultural land and a stream. This can greatly improve water quality (Liebowitz *et al,* 1992). Preserving wetlands, along with other flood control mechanisms is possible. The starting point is that apart from statutory duties on certain persons and organisations geared at ensuring a clean and hazard free environment, the individual has to be persuaded to play an active role to ensure a balance between the various conflicting interests such as immediate economic gain over long term strategies that will lower the severity of impact on a given resource.

Monitoring the Success of Reclamation, Restoration and Conservation of Wetlands: Restoration of a wetland is an arduous task. No single method may be wholly suitable. As such, a restoration exercise is a kind of apprenticeship for the landowners or government as there is no precisely planed route that is all encompassing. All the experiences eventually add up, and most attempts at restoration have yielded positive results. Needless to say, data compilation over a long period of time is important to enable future restoration agents know the extent of work that has been completed. This will also serve as an indicator for possible new parameters that may be amassed. Most often, the first attempt to restore wetland is in the area of vegetation. This is often achieved with great success. But then just because an area is green does not mean total restoration.

A period of ten years may not be enough to determine complete restoration, and successful long term models are not usually available (Zedler and Kentula 1986). Another indication of long term successful restoration is improvement of water quality. Apart from improvement in water quality and the restoration of natural habitats, restoration of wetland belts around lagoons will increase spatial heterogeneity and diversity of the landscape**.** The issues to look out for in determining the success of restoration is how other wildlife like birds, shellfish crustaceans are responding to the use of the restored site. Zedler and Kentula (1986) use reference data from wetlands being habited by clapper rails (indigenous birds) to define the criteria that can be used to judge suitability of restored areas for birds.

CONCLUSION

It can be seen that in less developed countries such as India and Nigeria, wetland management is an emerging concept. There is the need to create massive awareness on the proper benefits of wetland to promote best use practises**.** Thankfully, many governments are now vigilant over wetlands to avoid its conversion to mere dump sites or wastelands. Where any form of industrial or agricultural structures need to be put in place, the relevant permits are often obtained. In more developed economies such as the United States of America, some of the finest parks and fishing grounds on wetlands today are being maintained by people who are supportive of the conservation efforts. Even in US. , it is necessary to have models of restored wetlands that can be used as representations for future ones.

Fortunately, there is a growing body of literature in this regard. More so, the goal should not always be to replace functions, but to enhance biodiversity co-existence. In tackling the issue of wetland preservation, there has to be a collective will and effort by every stratum of society, irrespective of their own peculiar demographic needs to safeguard the wetlands. This will maintain the environment and give relative freedom from fear of flooding and other environmental disasters that could have been easily averted by proper preservation goals. Indeed, continued location and declaration of new and existing wetland sites will command international co-operation as to how best these sites are to be maintained. This can only be achieved through bilateral agreements, as well as individual local legislations.

There are over 158 contracting parties to the Ramsar Convention which came into effect in December 1975. About 1831 wetlands of international importance were listed as Ramsar sites in 1976 (Natural England). New sites have to be constantly located, while the contracting parties to the Convention have a duty to continue to meet and prioritise strategies for proper management and conservation of designated wetlands. Rather than creating artificial wetlands, more partnerships have to be in place to support private individuals, such as farmers in their conservation efforts. Management and monitoring can be improved with firmer implementation of existing policies, as well as conservation measures.

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